

- e) a transparent encapsulated material bonded to the first surface of the substrate to encapsulate the light emitting diode, the material being molded to form an ellipsoidal dome over the light emitting diode.
2. A light source as claimed in Claim 1, wherein the side wall of the recess is plated with a metallic layer presenting a silvered reflective surface to the light emitting diode.
3. A light source as claimed in Claim 2, wherein the metallic layer forms the terminal of the first interconnect.
4. A light source as claimed in Claim 1, wherein the substrate defines first and second vias extending between the upper and lower surfaces, a portion of each of the first and second interconnects extending through the first and second vias respectively.
5. A light source as claimed in Claim 1, wherein each of the conductive pads of the first and second interconnects includes a gold plated layer for electrically coupling to external circuitry.
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6. A light source as claimed in Claim 1 wherein the ellipsoidal dome formed by the transparent encapsulant material has a major axis equal to the length of the planar substrate and a minor axis equal to the width of the substrate.

REMARKS

Claims 1 through 5 were presented for examination. In the Office Action mailed March 13, 2002, claims 1, 2, 3 and 5 were rejected as anticipated by U.S. Patent 6,069,440 (Yoshinori Shimizu *et al.*, referred to as "Yoshinori") and claim 4 was rejected as obvious over Yoshinori in view of U.S. Patent 6,045,240 (Hochstein).

Reconsideration is respectfully requested.

Yoshinori discloses two completely different embodiments of an LED structure. One embodiment, illustrated in Figure 1, is a "lead type" LED. The other

embodiment, illustrated in Figure 2, is a "chip type" LED. It is important in considering the teachings of Yoshinori to keep these two embodiments distinctly in mind because these two different embodiments are not combinable nor does a given feature in one suggest a distinct feature in the other.

The lead type LED does not anticipate claim 1 because it does not show a planar substrate. Nor does it show first and second interconnects between upper and lower surfaces of the substrate to exposed pads on the lower surface. Rather, the lead type LED uses two separate leads: a mount lead 105 (upon which the LED is mounted) and an inner lead 106. A first wire (interconnect) is connected to the mount lead. A second wire (interconnect) is connected to the inner lead. Thus, the structure of the lead type LED is in marked contrast to claim 1, which requires:

- (a) a planar substrate having an upper surface and a lower surface ...
- (b) ...
- (c) a first electrically-conductive interconnect extending between the upper and lower surfaces, the first interconnect having a terminal on the upper surface coupled to the light emitting diode and an exposed pad on the lower surface for coupling to external circuitry,
- (d) a second electrically-conductive interconnect extending between the upper and lower surfaces, the second interconnect having a terminal on the upper surface coupled to the light emitting diode and a conductive pad on the lower surface for coupling to external circuitry, and
- (e) ...

Accordingly, the teaching of Yoshinori in respect of the lead type LED does not anticipate claim 1.

The chip type LED does not anticipate claim 1 because it does not show a transparent encapsulant material, as specified in element (e) of claim 1, "bonded to the first surface of the substrate" and "molded to form an ellipsoidal dome". Rather, the recess in the chip type LED is filled with a coating material that contains a specified phosphor to form a coating 201 (see, for example, Yoshinori column 8, lines 58-59). The most that could be suggested by the drawing and the associated description is that the recess is filled level with the top surface of the casing 204. There is no suggestion of an ellipsoidal dome or of a dome bonded to the substrate.

The ellipsoidal dome of the invention optimizes the surface mount LED package for use in video matrix displays by providing a wide viewing angle along one

plane (for example, horizontal) while narrowing the viewing angle along the other plane (for example, vertical), as described on page 6 of the application.

The lead type LED and the chip type LED of Yoshinori are so different from each other that combining the two to arrive at the present invention would not make sense. These two LEDs are designed for different purposes and therefore possess distinct structural differences. Yoshinori describes those features that may share a commonality between the lead type LED and the chip type LED. However, Yoshinori fails to disclose that the molding 104 of the lead type LED might be combined with the structure of the chip type LED. Presumably, had the inventors envisioned such a combination, they would have disclosed it. In fact, when Yoshinori discusses the molding material starting at column 16, line 58, it is only in the context of the lead type LED. If anything, this discussion teaches away from any effort to combine the lead type and chip type LEDs.

It is also noted that the first element of claim 1 describes a structure in which a recess is formed in a substrate. In contrast, both embodiments of Yoshinori require two or more elements to be glued or otherwise coupled together.

For the foregoing reasons, it is submitted that claim 1 is allowable over Yoshinori. It therefore follows that claims 2, 3 and 5, which depend from claim 1, are also allowable.

In addition, claim 2 is particularly directed to the novel feature of a metallic layer plated on the sidewall of the recess, presenting a silvered reflective surface. Yoshinori mentions a "reflecting function" (column 16, line 2) but only in the context of the lead type LED. In fact, Yoshinori in column 15, line 55, through column 16, line 15, refers only to polishing the cup 105a that is part of the metal lead 105 of the lead type LED. There is no corresponding structure, and no corresponding teaching, respecting the chip type LED, nor could there be, since the casing 204 in the chip type LED would be non-metallic. The structure set forth in claim 2 does not coincide with the structure of a lead type LED. Accordingly, Yoshinori does not anticipate claim 2.

Claim 3 depends from claim 2 and in addition specifies that the metallic layer required by claim 2 actually forms the terminal of the first interconnect. This is not disclosed with respect to either the lead type LED or the chip type LED of Yoshinori. The chip type LED, for example, is depicted as mounted on a substrate, not on the terminals 205. Yoshinori does not suggest connecting the chip type LED to a terminal using a metallic layer. Accordingly, Yoshinori does not anticipate claim 3.

Claim 4 was rejected as unpatentable over Yoshinori in view of Hochstein. Nothing in either reference suggests combining it with the other. And if such a combination were attempted, it would not provide the present invention. Accordingly, it is submitted that claim 4 is patentable over the references.

New claim 6 describes the dimensions of the ellipsoid in relation to the dimensions of the substrate, as disclosed in Figure 2 of the application. These dimensions allow for a particularly compact configuration that is neither disclosed nor suggested by Yoshinori. Accordingly the applicants submit that claim 6 is allowable over the cited references.

For the foregoing reasons, the case is believed to be in condition for allowance and an action to that effect is respectfully requested.

Respectfully submitted,

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